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(54) Apparatus and method for handling palletized cargo

(57) An apparatus for handling palletized cargo for ships, comprising a first lift means (1A) disposed on the exterior (13) of a ship and a second lift means (1B) disposed in the same cross-sectional plane on the interior (14) of the ship, and a horizontal cargo transfer and transportation assembly (1C) arranged between said first and second lifts (1A, 1B). The transfer assembly (1C) consists of forks (9) fastened to a frame (7), and the ends (18) of the frame are slidably mounted on rails (8). The movement of the frame (7) in the direction of transfer (D) is controlled by means of hydraulic cylinders (11). Each rail (8) is attached to parallel guide arms (5, 5'), the ends of the arms being rotatably attached respectively, to fastening brackets (4) disposed on the deck (12) of the ship and to the rail (8). The direction of movement (D') for the guide arms (5, 5') and thereby for the frame (7) toward the lifts is controlled by hydraulic cylinders (10). The first lift means (1A) is disposed in a recess provided in the side of the ship.

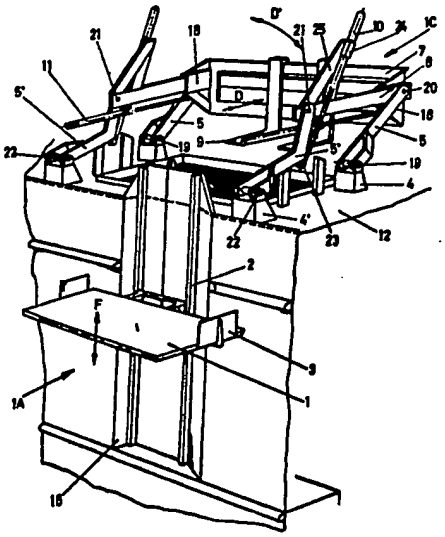

Fig. 1

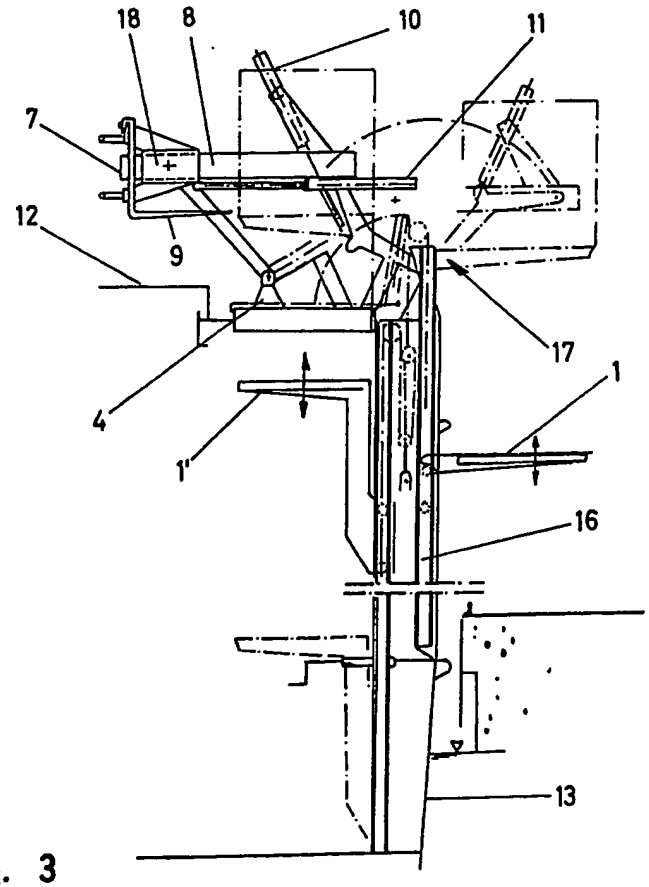

Fig. 3

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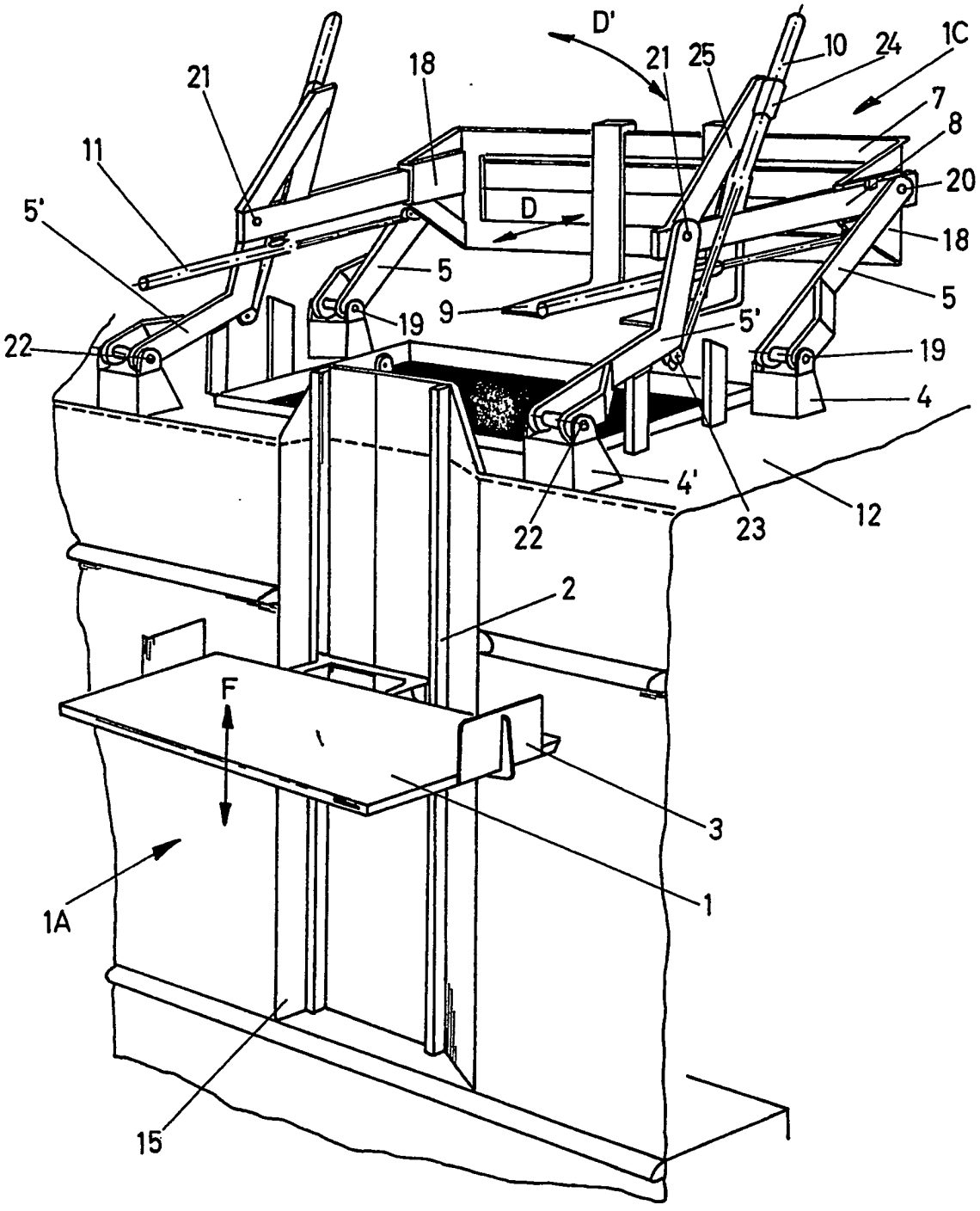

Fig. 1

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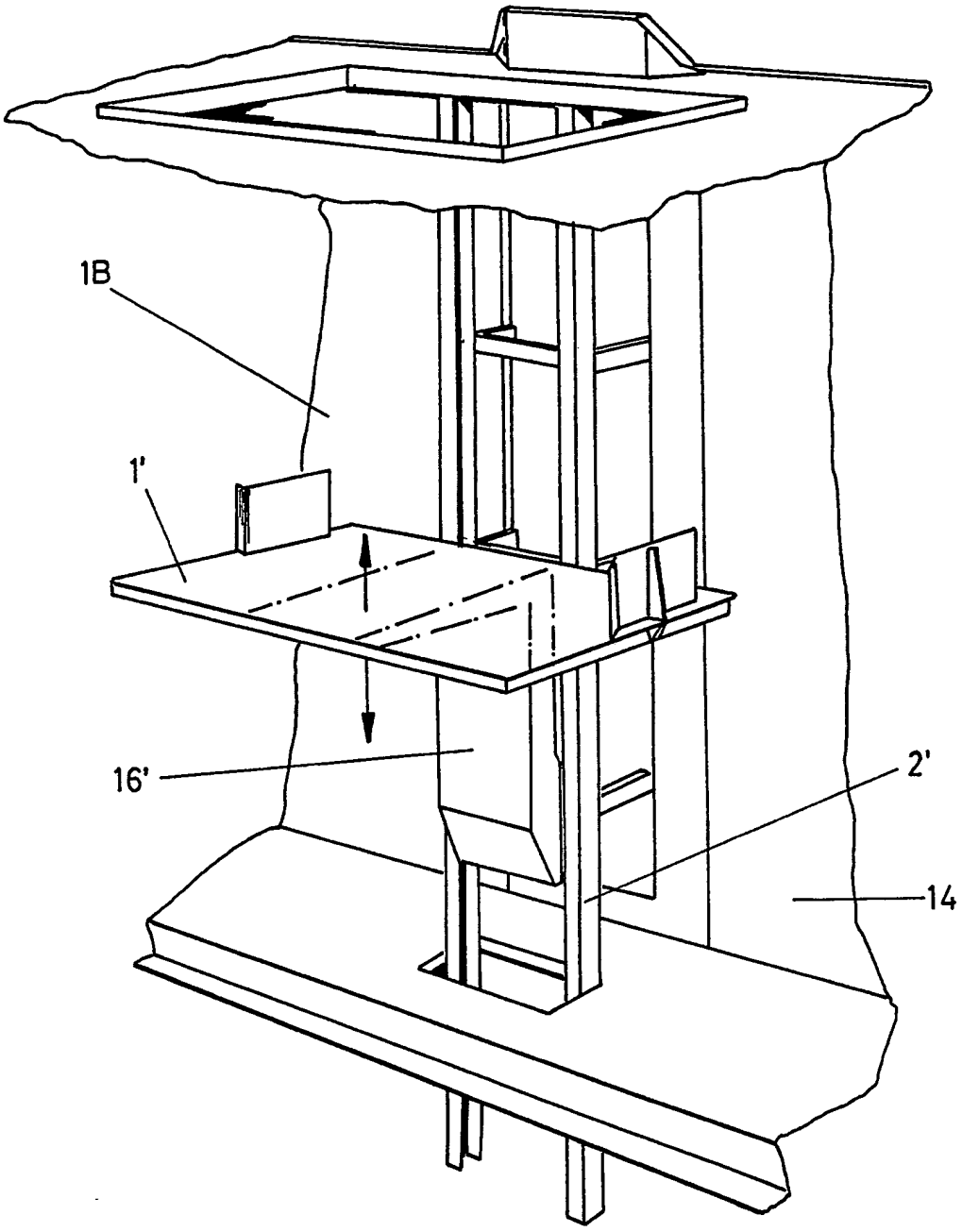

Fig. 2

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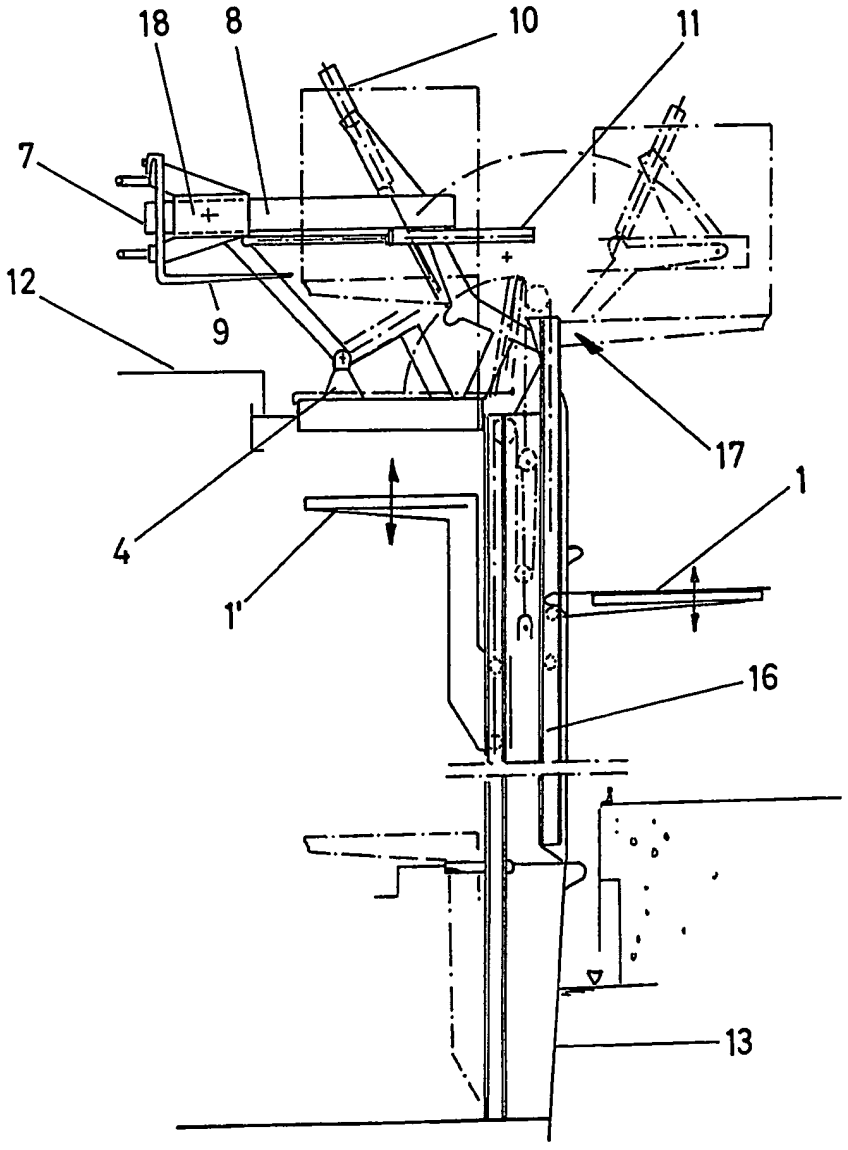

Fig. 3

SPECIFICATION

Apparatus and method for handling palletized cargo

The present invention relates to an apparatus and method for handling palletized cargo and is particularly suitable in connection with the loading and unloading of ships.

Systems utilizing elevator means for loading and unloading cargo on ships are previously known, e.g. from Norwegian Patents 139,162 and 141,201.

These known systems are rather complicated and expensive since they require side ports or other similar openings to be provided in a ship. Furthermore, it is not considered that one can obtain sufficiently rapid loading and unloading with the known systems.

One aspect of the invention provides an apparatus for handling palletized cargo which apparatus comprises a pair of opposed platforms for receiving palletized cargo and operable to raise and lower cargo in parallel vertical planes, and a cargo transfer mechanism arranged to transfer cargo from one platform to the other platform when the platforms are at or adjacent their maximum height, characterized in that said transfer mechanism includes a transfer platform and means for causing translatory and/or oscillatory movement of the transfer platform between said vertical planes.

Another aspect of the invention provides a method of handling palletized cargo which method comprises the steps of raising cargo on a first platform movable in a first vertical plane, transferring the cargo to a second opposed platform movable in a second vertical plane, and located parallel to the first vertical plane, by causing the cargo to be subjected to translatory and/or oscillatory movement between those planes, said transfer being effected when both platforms are at or adjacent their maximum height, and lowering the cargo on said second platform.

Yet another aspect of the invention provides cargo loading and unloading apparatus of the type which is characterized in that the transfer assembly consists of forks fastened to a slidable frame, the ends of the frame being disposed on rails, wherein the movement of the frame in the direction of transfer is controlled by means of hydraulic cylinders, and in that each rail is attached to parallel guide arms, the ends of the arms being rotatably attached, respectively, to fastening brackets disposed on the deck of the ship and to the rail, wherein the direction of movement for the guide arms and thereby for the frame toward the lifts is controlled by hydraulic cylinders.

With the present invention, the price for the pallet elevator, including installation, is estimated to be about 1/5 of the price for a conventional side port. This solution has thus come down to a price level which makes it feasible to install it even on smaller ships which sail along coastlines, where such a system is of the utmost importance, especially since experience has shown that when suitable tonnage for efficient pallet transportation is required, it has often proved difficult, if not impossible, to provide the tonnage for such transportation.

With a loading/unloading system in accordance with the present invention, it is possible to automate the apparatus such that at all times there will be one set of pallets on the external lift, one set of pallets on the internal lift, and one set of pallets on the transfer assembly. In other words, three sets of pallets will be in rotation simultaneously. Such automation will thus result in a three times faster loading/unloading rate in comparison with previously known systems, e.g. wherein the lift device guides pallets from the truck up along the outside of the ship, travels inwardly, and passes down into the hold of the ship, and returns empty for reloading.

The invention will be explained in greater detail in the following with reference to an embodiment example of the apparatus according to the invention, as illustrated on the accompanying drawings, wherein:–

Figure 1 shows the loading/unloading apparatus as seen from outside the ship, in perspective,

Figure 2 shows the loading apparatus as seen from the interior of the ship, and

Figure 3 shows the loading/unloading apparatus in cross section.

Fig. 1 shows a section of the exterior 13 of a ship, having a recess 15 therein in which the lift means 1A is disposed. The lift 1A consists of a platform 1 with stop barriers 3 at each side and with a slide member 16 which can be moved up and down as indicated by the arrow F along guides 2. A second, corresponding lift means 1B (Fig. 2) is disposed on interior 14 of the ship. The number 16′ designates the slide member for the lift 1B, which travels in guides 2′ and has a platform 1′, these components corresponding to those on the external lift 1A. Transfer of cargo between the external 1A and internal 1B lifts occurs by means of a transfer assembly 1C which is shown in Figs. 1 and 3. This assembly consists of forks 9 which are fastened to a frame 7, and the respective ends 18 of the frame slide on rails 8, such that when for instance the external lift has been raised to its upper end position 17, the forks can be moved forward and inserted beneath the pallet cargo to lift the pallet off the external lift, or can be withdrawn from a pallet which is to be unloaded onto the lift. The direction of movement for the forks is indicated by the double arrow D in Fig. 1. The movement of the forks is controlled by means of hydraulic cylinders 11 disposed on the rails 8 and

attached to the frame 7 at the lower edge of the ends 18 of the frame. The forks and the frame are also given an arcing movement D′ toward and away from the lift devices. This is obtained in that each rail 8 is rotatably attached to parallel guide arms 5, 5′. The guide arms 5 are rotatably attached to the respective rails at the point 20 and to the deck 12 of the ship by means of brackets 4 and bolts 19. The arms 5′ are rotatably attached to the respective rails 8 at 21 and rotably attached at the other end 22 of the arm to brackets 4′ which are fastened to the deck 12. The arms 5′ have been given an angle configuration, and attached to the lower edge 23 of the arm at the apex of the angle is a hydraulic cylinder 10; the opposite end 24 of the cylinder is attached to an outwardly-projecting member 25, which is attached to the end of the rail 8 at 21 and which projects above the rail. By means of the hydraulic cylinders 10, the transfer assembly 1C can be moved in an arc D′ into various positions, as shown in Fig. 3 with dotted-dashed lines. This movement occurs independently of the back-and-forth movement D of the forks. In this way, through automation of the functions, one can coordinate the two movements and thus obtain a fully automatic loading and unloading apparatus.

One advantage of the invention is that it enables ships to be loaded and unloaded at quays of different heights and at varying tide levels.

Another advantage provided by the apparatus according to the invention is that the apparatus can be adapted for use in conventional ships, especially smaller ships which normally do not have side ports.

The invention further advantageously provides an apparatus which is inexpensive and simple to install, and which is at low-weight.

Yet another advantage is that the apparatus can operate automatically and has a high capacity.

CLAIMS

1. Apparatus for handling palletized cargo which apparatus comprises a pair of opposed platforms for receiving palletized cargo and operable to raise and lower cargo in parallel vertical planes, and a cargo transfer mechanism arranged to transfer cargo from one platform to the other platform when the platforms are at or adjacent their maximum height, characterized in that said transfer mechanism includes a transfer platform and means for causing translatory and/or oscillatory movement of the transfer platform between said vertical planes.

2. A method of handling palletized cargo which method comprises the steps of raising cargo on a first platform movable in a first vertical plane, transferring the cargo to a second opposed platform movable in a second vertical plane, and located parallel to the first vertical plane, by causing the cargo to be subjected to translatory and/or oscillatory movement between those planes, said transfer being effected when both platforms are at or adjacent their maximum height, and lowering the cargo on said second platform.

3. An apparatus for loading/unloading palletized cargo, comprising a first lift means (1A) disposed on the exterior (13) of a ship and a second lift means (1B) disposed in the same cross-sectional plane on the interior (14) of the ship, and a horizontal cargo transfer and transportation assembly (1C) arranged at the upper end position (17) for said first and second lifts (1A, 1B), characterized in that the cargo transfer assembly (1C) consists of forks (9) fastened to a slidable frame (7), the ends (18) of the frame being mounted on slide rails (8), wherein the movement of the frame (7) in the direction of transfer (D) is controlled by means of hydraulic cylinders (11), and in that each rail (8) is attached to parallel guide arms (5, 5′), the ends (19, 20, 21, 22) of the arms being rotatably attached, respectively, to fastening brackets (4, 4′) disposed on the deck (12) of the ship and to the rail (8), wherein the direction of movement (D′) for the guide arms (5, 5′) and thereby for the frame (7) toward the lifts (1A, 1B) is controlled by hydraulic cylinders (10).

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